

Clues to healthy aging found in the gut bacteria of centenarians

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Healthy centenarians show diverse microbiome populations with enhanced levels of secondary bile acids

The relationship between [lifespan and the bacteria](#) living inside our gut is perhaps one of the stranger corners of scientific research right now. A new study published in the journal *Nature*, investigating the microbiomes of centenarians, offers clues to how gut bacteria may engender healthy aging.

The research looked at fecal samples from 160 centenarians in Japan. The cohort had an average age of 107 and the majority were free of chronic diseases such as cancer or diabetes. The results were compared to an elderly cohort, aged in their mid-80s, and a young cohort aged between 20 and 50.

In general the researchers detected a number of bacterial species specifically enriched in the centenarian group compared to the two controls. The bacteria found in higher levels in the centenarians were known to play a major role in the production of secondary bile acids.

Bile acids are vital elements for effective digestion and metabolism. Primary bile acids are synthesized in the liver while secondary bile acids are generated by bacteria in our gut.

The main finding from this new research is the hypothesis that these centenarians potentially remain relatively healthy into extreme old age by maintaining a diverse microbiome modulated by high volumes of these secondary bile acids. The study particularly focused on one secondary bile acid called isoalloLCA.

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The researchers conducted mice studies and found directly feeding the animals isoalloLCA stifled the growth of a number of pathogenic gut bacteria species known to play a role in inflammation. This indicates isoalloLCA, and other secondary bile acids, may play a key role in keeping gut bacterial populations in healthy equilibrium.

“The ecological interaction between the host and different processes in bacteria really suggests the potential of these gut bugs for health maintenance,” says Damian Plichta, co-first author on the new research.

The findings follow on from other centenarian microbiome studies indicating healthy aging can be linked with certain gut bacteria profiles. Kim Barrett, a researcher from UC San Diego who did not work on this new study, says it is early days for this kind of research with studies still only revealing correlations, but these new findings certainly offer a plausible causal mechanism worthy of further investigation.

“...bile acids are emerging as a new class of “enterohormones” beyond their classic role in fat digestion and absorption,” notes Barrett. “It is certainly conceivable that manipulating concentrations of specific bile acids, whether microbially or by giving them directly, could exert health benefits.”

As one of the secondary bile acids detected in the study was found to inhibit the growth of a specific type of antibiotic resistant bacteria, one of the more immediate outcomes from this study is further investigations into how bile acids could be manipulated to treat related antibiotic-resistant bacterial diseases. Ramnik Xavier, co-corresponding author on the study, says this preliminary work also offers other researchers a starting point to investigate specific molecules to engender healthy aging.

“A unique cohort, international collaboration, computational analysis, and experimental microbiology all enabled this discovery that the gut microbiome holds the keys to healthy aging,”

says Xavier. "Our collaborative work shows that future studies focusing on microbial enzymes and metabolites can potentially help us identify starting points for therapeutics."

The new study was published in the journal [*Nature*](#).